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Hope, Bruce. "A Basin-Specific Aquatic Food Web Biomagnification Model For Estimation of Mercury Target Levels." ***Environmental Toxicology and Chemistry*** **22.10 (2003): 2525-2537.**
(Reviewed by Lucy Cho)

The presence of methyl mercury in fish tissue in the Willamette River has become a potential health risk to humans. Under the Clean Water Act, health advisories feel the need to establish a TMDL or total maximum daily load for mercury in the Willamette River Basin. The concern is that methyl mercury is known to become biomagnified within aquatic food webs. The mercury levels in fish tissue most likely come from biomagnification through diet rather than uptake of mercury from water by the gills.

It is also thought that the relative contribution of mercury to the food web depends on the particular species of fish, but the type of mercury also plays a role in bioaccumulation. Inorganic mercury is easily accumulated in the environment and is the dominant form, it is also quickly depurated. However, the organic form, methyl mercury, is not as quickly depurated and is more easily biomagnified in higher-trophic-level animals. Also the half-life of this type of mercury is much longer than that of the inorganic mercury. The purpose of this study was to estimate a target mercury water concentration, which requires a biomagnification factor (BMF) and a fish tissue criterion protective of human health.

Critique

What I liked about this study was that it helped to determine a biomagnification factor specific to different regions along the Willamette River. The U.S. EPA wanted BMFs for particular sites of concern, which could not be done with default values, and they wanted to include site-specific considerations when calculating a surface-water target level. They used a food-web biomagnification model that focused on some resident species of fish that were of concern to WRB TMDL stakeholders. This model was calibrated to the Willamette River Basin using basin-specific tissue and water data, and this allowed them to estimate BMF values that were regionally specific.

I thought the specificity was an important aspect of this paper and although its purpose was not to choose a mercury TMDL because that task was to be accomplished through public policy, it at least gave the EPA the information they needed. Also, the mathematical model they developed can be used to estimate surface water mercury concentration that is within the acceptable range for tissue mercury levels in populations of fish in the Willamette River Basin, and I think it would prove very useful for future studies on this topic.

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